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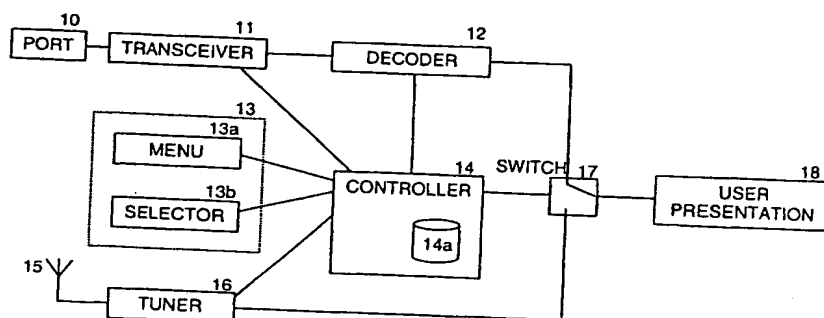
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- (71) Applicant (for all designated States except US): **NORTEL NETWORKS LIMITED [CA/CA]**; World Trade Center of Montreal, 380 St Antoine Street West, 8th floor, Montreal, Quebec H2Y 3Y4 (CA).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **ROBINSON, S** [GB/GB]; 341 Caephilly Road, Cardiff, Gwent CF14 4QF (GB).
- (74) Agent: **RYAN, J., P., W.**; Nortel Networks UK Limited, IP Law Group, London Road, Harlow, Essex CM17 9NA (GB).
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(54) Title: INTERNET ENABLED BROADCAST RECEIVING APPARATUS



(57) Abstract: A broadcast receiving apparatus, related apparatus and operation methods, and broadcast and telecommunications signals arranged to support selection and receipt of both radio frequency broadcast and internet data in a single device. Selection of radio frequency broadcast signals can be made responsive to the internet data; and selection and presentation of internet data can be made responsive to the radio frequency broadcast signals. Where the internet data is a webcast channel, handoff between radio frequency broadcast and webcast channels may be automated using information carried in broadcasts and/or telecommunications signals or both.

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## INTERNET-ENABLED BROADCAST RECEIVING APPARATUS

### FIELD OF THE INVENTION

5 The present invention relates to an broadcast receiving apparatus, method, and software for receiving both radio-frequency public broadcast signals and signals transmitted via a telecommunications network, corresponding transmitter systems, and transmitted signals, a systems incorporating the same.

### BACKGROUND TO THE INVENTION

10 Public broadcast of for example television and radio signals utilising frequency modulation (FM) and/or amplitude modulation (AM) is well known. Domestic receivers for such signals are also well known and include television sets, video receiver/recorders, and a wide range of radio receivers. Such receivers typically comprise an in-built antenna to receive the signals, but this requires that the set be within range of a broadcast antenna broadcasting on a frequency capable of  
15 being received by the set. However broadcast of any given channel is typically geographically constrained limited both by the availability of suitable broadcast antennas, and regulatory approval to broadcast at a given frequency within a given geographic area. Increasing numbers of listeners/viewers take an interest in receiving local broadcast stations whether because of an interest in local  
20 issues, or because the local station addresses a particular interest group.

A problem with the present arrangement is that where listeners/viewers move out of the broadcast area associated with such stations, whether temporarily by, for example, travelling on business or more permanently by, for example, moving home to a new area, then the listeners will no longer be able to receive the  
25 broadcasts.

More recently some formerly broadcast-only channels have become available via the Internet. In such an arrangement a personal computer is programmed to receive a digital signal stream via a telephone line to the home/office. The personal computer receives and decodes a signal and plays the received signal  
30 via the computer screen and/or loudspeakers. A wide range of formerly broadcast-only channels are available via the Internet in this way, as are an increasing number of "channels" which are available only on the Internet. These

latter take advantage of the fact that such distribution via the Internet does not require a regulatory broadcast licence.

5 However a disadvantage with such an Internet radio arrangement is that it requires a fully functional personal computer typically with large display, keyboard etc. These are typically much more expensive than a conventional broadcast radio receiver to which consumers are accustomed.

#### OBJECT OF THE INVENTION

10 The invention seeks to provide an improved apparatus and method for receipt of public broadcast and Internet broadcast channels and which mitigates the problems associated with the prior art.

#### SUMMARY OF THE INVENTION

15 According to a first aspect of the present invention there is provided a broadcast receiving apparatus comprising: first apparatus arranged to receive radio frequency broadcast signals; and second apparatus arranged to transmit and receive telecommunications signals over a telecommunications link; wherein a second signal received by one of the first and second apparatuses is presented to a user responsive to a characteristic of a first signal received by the other of the first and second apparatuses.

20 In a preferred embodiment the broadcast receiving apparatus additionally comprises: a electronic storage device; and the second signal is presented to the user responsive to pre-determined data stored in the electronic storage device. )

In a further preferred embodiment the first signal is one of the radio frequency broadcast signals; and the characteristic is received signal strength.

25 In a further preferred embodiment the first signal is one of the radio frequency broadcast signals; and the characteristic is radio frequency broadcast signal content indicative of an internet address.

30 Preferably, the radio frequency broadcast signal content indicative of an internet address comprises at least one of radio frequency broadcast channel identification data, an internet address, and a URL.

Preferably, the radio frequency broadcast signal content is encoded as Radio Data System (RDS) data.

Preferably, the telecommunications signals are an internet broadcast channel.

5 Preferably, the first signal is one of the telecommunications signals; and the characteristic is telecommunications signal content indicative of a radio frequency broadcast signal.

Preferably, the second signal is presented to user responsive to an indication of the location of the broadcast receiving apparatus.

10 Preferably, the telecommunications link is a fixed access telecommunications link.

Preferably, the wireless telecommunications link is a mobile access telecommunications link.

Advantageously, use of a wireless link facilitates mobile use of the receiver apparatus.

15 Advantageously the apparatus can be used to receive broadcast channels (whether broadcast as radio frequency signals or webcast signals) whether or not in range of a radio frequency broadcast transmitter, or whether or not a network connection is available.

20 The invention also provides for a system for the purposes of telecommunications which comprises one or more instances of apparatus embodying the present invention, together with other additional apparatus.

According to a second aspect of the present invention there is provided a telecommunications system comprising broadcast receiving apparatus according to the first aspect.

25 According to a third aspect of the present invention there is provided a radio-frequency broadcast transmission apparatus comprising: apparatus arranged to broadcast data associated with broadcast channel content on that broadcast channel and in which the data comprises an indication of an internet address associated with that radio frequency broadcast channel.

Preferably, the internet address is indicative of a webcast channel.

Preferably, the indication of an internet address comprises an indication of an internet address and channel identification data associated with the broadcast.

According to a fourth aspect of the present invention there is provided a radio frequency broadcast system comprising radio frequency broadcast transmission apparatus according to the third aspect.

According to a fifth aspect of the present invention there is provided a radio frequency broadcast signal carrying broadcast channel content and an indication of an internet address associated with the broadcast channel content.

Preferably, the indication is indicative of a webcast channel.

The invention is also directed to methods by which the apparatus operates and including method steps for carrying out every function of the apparatus:

According to a sixth aspect of the present invention there is provided a method of operating broadcast receiving apparatus comprising: first apparatus arranged to receive a radio frequency broadcast signals; and second apparatus arranged to transmit and receive telecommunications signals over a telecommunications link; the method comprising the steps of: receiving a first signal at one of the first and second apparatuses; presenting to a user of the apparatus, and responsive to the first signal, a second signal received at the other of the first and second apparatuses.

According to a seventh aspect of the present invention there is provided a method of effecting handoff between a radio frequency broadcast and a telecommunications link comprising the steps of: receiving a radio frequency broadcast signal comprising a broadcast channel and associated data indicative of an associated internet address; requesting, responsive to the internet address, a download of data over the telecommunications link.

According to an eighth aspect of the present invention there is provided a method of effecting handoff between a telecommunications link and a radio frequency broadcast receiver comprising the steps of: receiving a webcast channel over the telecommunications link, together with associated data indicative of an associated broadcast channel; tuning the radio frequency broadcast receiver to a broadcast channel responsive to the data indicative of an associated broadcast channel.

According to a ninth aspect of the present invention there is provided a method of operating a broadcast receiving apparatus comprising first apparatus arranged so as in a first mode to enable selection and receipt of a radio frequency broadcast channel, and second apparatus arranged so as in a second mode to enable selection and receipt of a webcast channel over a telecommunications link, said method comprising the steps of: selecting a first channel in a first of said modes; selecting a second channel in a second of said modes.

Advantageously, switching between modes can take place without user intervention.

Advantageously, switching between modes can take place without user intervention.

The invention is also directed to a program for a computer, comprising components arranged to perform each of the method steps:

According to a tenth aspect of the present invention there is provided control software on a computer readable medium for a broadcast receiving apparatus comprising: first apparatus arranged to receive a radio frequency broadcast signals; and second apparatus arranged to transmit and receive telecommunications signals over a telecommunications link; the software being arranged to perform the steps of: monitoring a characteristic of a first signal received by one of the first and second apparatuses; presenting to a user a second signal received by the other of the first and second apparatuses responsive to the characteristic.

The preferred features may be combined as appropriate, as would be apparent to a skilled person, and may be combined with any of the aspects of the invention.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

In order to show how the invention may be carried into effect, embodiments of the invention are now described below by way of example only and with reference to the accompanying figures in which:

Figure 1 shows an example of a block circuit diagram of a first embodiment of apparatus in accordance with the present invention;

Figure 2 shows a first example of how apparatus in accordance with the present invention would receive Internet and/or public broadcast channels;

Figure 3 shows a second example of how a receiver in accordance with the present invention would receive Internet and/or public broadcast channels.

5 Figure 4 shows an example of a block circuit diagram of a further embodiment of apparatus in accordance with the present invention;

Figures 5 and 6 shows high level flow diagrams of methods in accordance with the present invention.

#### DETAILED DESCRIPTION OF INVENTION

10 Referring now to Figure 1, there is shown a block circuit diagram of a Internet enabled broadcast receiving apparatus. The receiving apparatus comprises a network port 10, transceiver 11, decoder 12, channel selection apparatus 13, controller 14 (comprising some data storage capacity 14a), broadcast receiving antenna 15, tuner 16, switching function 17, and user presentation device 18.

15 In a first embodiment, the user presentation device 18 is switchably connected 17 at any one time either to an output from the tuner 16 or an output from the decoder 12. The tuner is connected to and receives broadcast signals via antenna 15. Decoder 12 is connected via the transceiver 11 to the network port 10 via which it receives signals when the port is connected to a suitable network  
20 (for example the Internet). The controller 14 is connected to the transceiver 11, decoder 12, switch 17, and tuner 16. The channel selector 13 comprises a menu presentation apparatus 13a (for example a small liquid crystal display) and apparatus 13b for selecting items from a menu (for example user operable buttons to pan up and down through a menu and to confirm selection of a  
25 specific displayed item in such a menu). The selector 13b may also include apparatus for selecting whether to receive public broadcast signals or Internet broadcast signals.

The apparatus is arranged to operate in one of two modes: in a first mode as a  
30 conventional public broadcast receiver; in a second mode as an Internet broadcast ("Webcast") receiver.

In the first mode the apparatus operates as a conventional public broadcast receiving device. The menu display 13a shows an indication of the channel currently tuned to whilst selector buttons 13b allow the user to scan available

frequencies for retuning to another channel. The controller conveys the selection to the tuner and toggles the switch 17 to connect the output from the tuner 16 to the user presentation device.

5 In a second mode, the menu presentation device 13a presents to a user one or more menus which enable the user by means of the selector device 13b to select an Internet broadcast channel for reception. Once a specific channel has been selected, the controller causes a signal to be sent via transceiver 11 and network port 10 to request receipt of the selected channel from the network. The subsequently received signal is received at port 10 and conveyed via transceiver 11 to a decoder 12 (for example in the form of a digital to analogue converter) the output signal of which is fed via switch 17 to the user presentation device 18.

10 The specific arrangement described assumes that the tuner is arranged to output an analogue signal to the user presentation device. However where for example the tuner is arranged to output digital signals and/or the user presentation device is arranged to receive digital signals, then decoder 12 may be removed or additional digital to analogue and analogue to digital converters inserted in the circuit as would be apparent to one skilled in the art.

15 The menus presented to the user 13a may either be flat (that is, a single listing of all available channels) or, preferably, structured in hierarchical fashion to simplify navigation. For example a first menu presented to the user may allow selection of a geographical area in the world, selection of which leads to presentation of a second menu listing countries within that geographical area, selection of one of which leads to a third menu which lists individual stations transmitted from the selected country. The present invention is not however restricted to such a structuring and alternative structurings could also be applied, for example according to type of transmission (for example jazz, blues, classical, early music, etc.).

20 Whether the menus are flat or structured, they may be stored locally within the controller apparatus 14 or downloaded on demand via network port 10. In a preferred embodiment menus may be downloaded from the network but are also cached within the controller apparatus 14. In this way a listener may select a channel details of which are retained in the cache, even though a local network menu server is unavailable, provided the preferred channel itself is nevertheless still available via the network.



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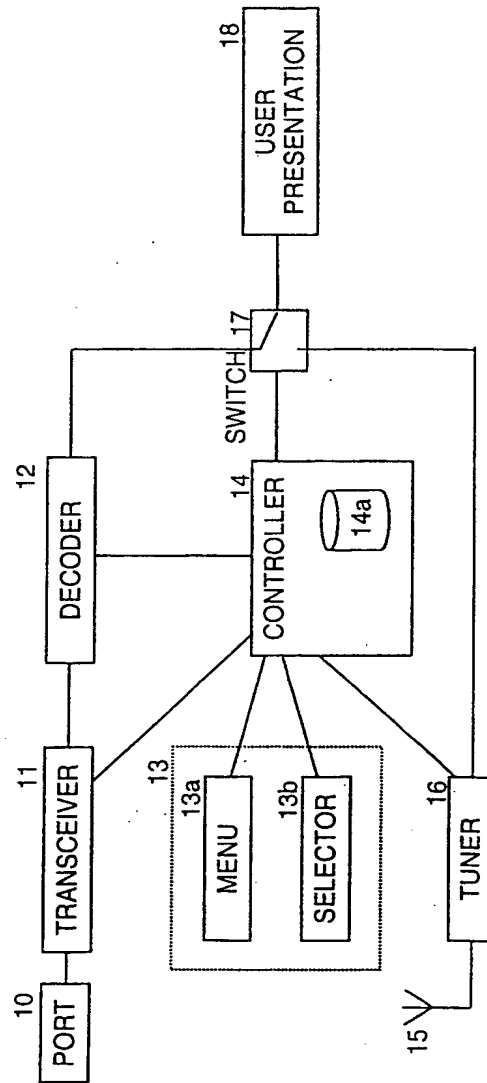
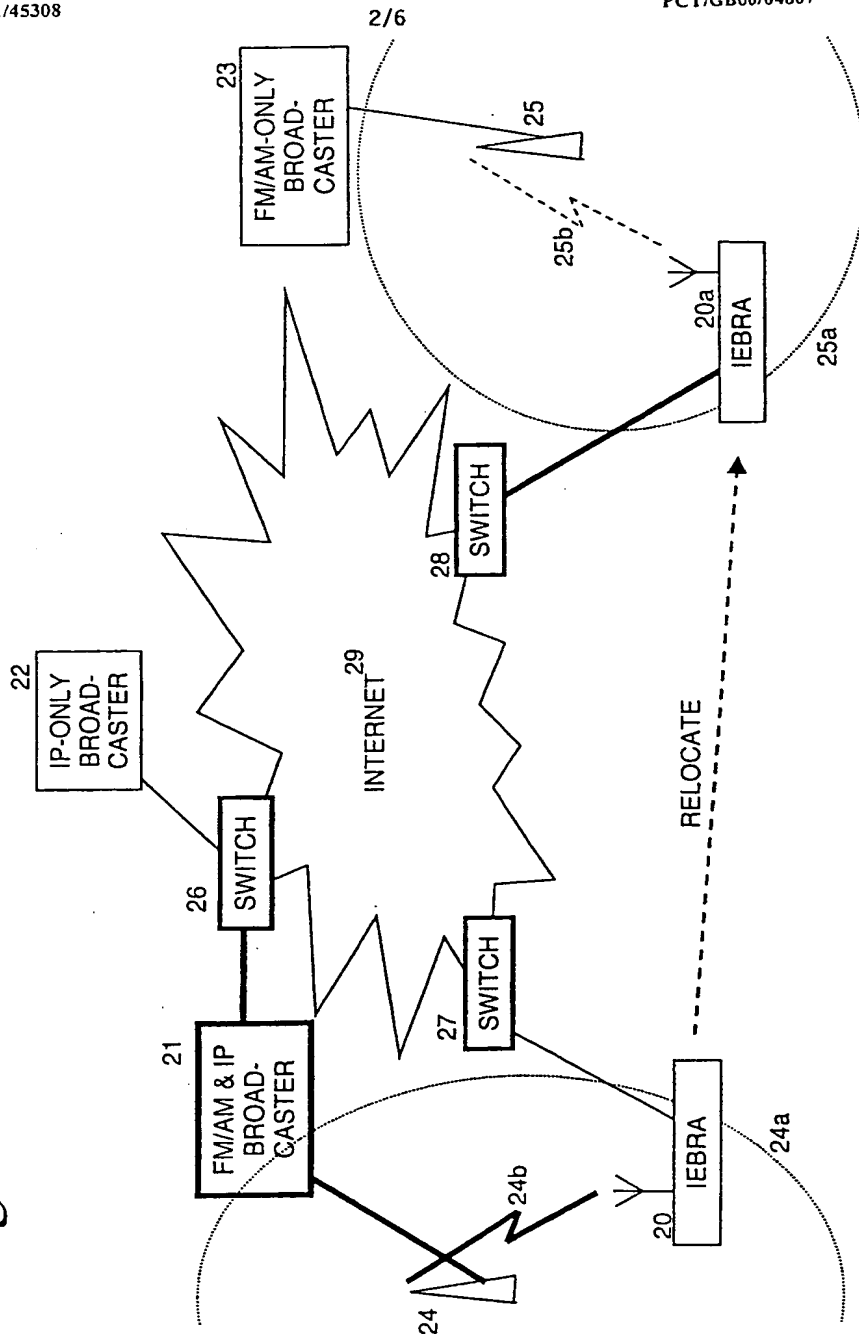
Fig. 1

Fig. 2



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